

Claims

What is claimed is:

1. A method for analyzing a data storage apparatus containing a transducer head positionable adjacent a data storage media surface, the method comprising steps of:
  - (a) detecting a defective region of the surface; and
  - (b) assigning a category for the defective region by combining a plurality of readback signals each received during a respective pass of the transducer head adjacent the defective region.
2. The method of claim 1 in which the assigning step (b) includes a preliminary step (b1) of defining a profile for each of at least 3 categories defining a set that includes the category assigned for the defective region.
3. The method of claim 1 in which the assigning step (b) is completed while the combination of readback signals has been compared against at most about 100 profiles each corresponding to a respective primary category, the assigned category being one of the respective categories.
4. The method of claim 1 in which the category has an identifier indicating whether the defective region is likely to contain a scratch.
5. The method of claim 1 in which the deriving step (b) further includes a step (b1) of indicating that the defective region is unreliable if a substantial portion of the defective region has a near-zero field strength, and otherwise not generally indicating that the defective region is unreliable.

6. The method of claim 1 in which the deriving step (b) includes steps of:
- (b1) receiving a first one of the read signals from the transducer head as the head passes through the defective region while following a first track;
  - (b2) receiving a second one of the read signals from the transducer head as the head passes through the defective region while following a second track;
  - (b3) receiving several more of the read signals from the transducer head as the head passes through the defective region; and
  - (b4) generating a graphic image of the defective region from the signals received in steps (b1) - (b3).
7. The method of claim 6 in which the deriving step (b) further includes steps of:
- (b5) visually recognizing the image as a likeliest one of a predetermined set of known defect types each having a name; and
  - (b6) assigning the name of the likeliest type as the category for the defective region.
8. The method of claim 6 in which step (b4) is performed so that the image is a useful topographical image representing an array of data points each having independent coordinates X, Y and Z, in which each combination of X and Y maps to a corresponding unique location on the data storage media surface and to a corresponding Z derived from a readback signal received while the transducer head was adjacent the corresponding unique location on the data storage media surface.
9. The method of claim 1 in which the deriving step (b) further includes steps of:
- (b1) deriving an estimate of how much of the defective region is characterized by a less-than-nominal, intermediate field strength; and
  - (b2) indicating that the defective region is unreliable if the estimate is lower than a predetermined threshold, and otherwise not generally indicating that the defective region is unreliable.

10. The method of claim 1 in which the category includes an indication of whether the defective region is likely to contain corrosion.
11. The method of claim 10, further including step of:
  - 5 (c) modifying a list of bad sectors in a manner that depends upon the indication; and
  - (d) retaining the modified list in the data storage apparatus.
12. A data storage apparatus containing a list of bad sectors that is modified according to the method of claim 11.
- 10 13. The method of claim 1, further including steps of:
  - (c) assigning a value to each of the defective regions for which the category is assigned; and
  - (d) reworking the data storage apparatus if an aggregation of the assigned values exceeds a predetermined threshold, and otherwise generally marking the data storage apparatus as acceptable.
- 15 14. A data storage apparatus that is marked as acceptable according to the method of claim 13.
- 20 15. The method of claim 13 in which the conditional reworking step (d) further includes steps of:
  - (d1) also performing the steps (a) and (b) upon a multiplicity of other data storage devices;
  - 25 (d2) identifying a recurring category common to a subset of the multiplicity of data storage devices;
  - (d3) disassembling a minority of the subset of the data storage devices; and
  - (d4) deriving the predetermined threshold based upon a visual analysis of the disassembled data storage device(s).

16. A data storage apparatus that is marked as acceptable according to the method of claim 15.
17. The method of claim 1 in which the assigning step (b) includes a step (b1) of receiving all of the plurality of read signals from the transducer head while the data storage apparatus is sealed with a top cover.
18. The method of claim 17 in which the category has an identifier indicating whether the defective region is likely to contain a scratch.
19. The method of claim 17 in which the deriving step (b) includes steps of:
- (b2) receiving a first one of the read signals from the transducer head as the head passes through the defective region while following a first track; and
  - (b3) receiving a second one of the read signals from the transducer head as the head passes through the defective region while following a second track.
  - (b4) receiving several more of the read signals from the transducer head as the head passes through the defective region; and
  - (b5) generating a topographical image of the defective region from the signals received in steps (b2) - (b4).
20. The method of claim 17 in which the deriving step (b) further includes a step (b2) of deriving an indication of how much of the defective region has a field strength within a predetermined range.
21. The method of claim 17, further including step of:
- (c) modifying a list of bad sectors in a manner that depends upon the category assigned; and
  - (d) retaining the modified list in the data storage apparatus.

22. A data storage apparatus containing a list of bad sectors that is modified according to the method of claim 21.

23. The method of claim 17, further including steps of:

- (c) assigning a value to each of the defective regions for which the category is assigned; and
- (d) reworking the data storage apparatus if an aggregation of the assigned values exceeds a predetermined threshold, and otherwise generally marking the data storage apparatus as acceptable.

24. A data storage apparatus that is marked as acceptable according to the method of claim 23.

25. A data storage apparatus comprising:

- a media surface containing a defective region;
- a transducer head positionable adjacent the surface; and
- means for assigning a category for the defective region by combining a plurality of readback signals each received during a respective pass of the transducer head adjacent the defective region.

26. The apparatus of claim 25 in which the assigning step (b) includes a preliminary step (b1) of defining a profile for each of at least 3 categories defining a set that includes the category assigned for the defective region.

27. The apparatus of claim 25 in which the assigning step (b) is completed while the combination of readback signals has been compared against at most 30 profiles each corresponding to a respective category, the assigned category being one of the respective categories.

28. The apparatus of claim 25 in which the category has an identifier indicating whether the defective region is likely to contain a scratch.
- 5 29. The apparatus of claim 25 in which the assigning means includes means for generating a topographical image of the defective region of the media surface.
30. The apparatus of claim 25 in which the assigning means is configured to receive all of the plurality of read signals from the transducer head while the media storage and transducer head are is sealed in a substantially opaque chamber.
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